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(12) **APPLICATION FOR PATENT FOR AN INVENTION A1**

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(60) References to other related national documents:	(73) Owner(s):
	(74) Agent: CABINET LAURENT ET CHARRAS

(54) **DEVICE FOR ATTACHING A LIGAMENT PROSTHESIS**

(57) This device comprises means (3) and (4) suitable to be inserted and positioned in holes made in the thickness of spinous apophyses (E1) (E2), said means (3) and (4) being shaped to allow the passage of attaching elements (6) working together with fittings (5) on the free ends of said ligaments (2).

[drawing]

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Device for attaching a ligament prosthesis

The invention belongs to the technical sector of intervertebral prostheses.

To ensure intervertebral containment, the use of prostheses is known for connecting ligaments to rigid or flexible blocks, generally placed between the spinous processes of vertebrae. The purpose of this type of prosthesis is to stabilize flexion-extension and rotation. Generally, the ends of ligaments are sewed in bundles of eight, between the spinous processes.

Starting with this basic idea, the problem the invention proposes to solve is to improve the attachment of ligaments at the spinous processes.

To solve such a problem, a device for attaching a ligament prosthesis was designed and developed, comprising a shock-absorbing element placed between two spinous processes, said element being shaped for the passage of artificial ligaments.

According to the invention, the device comprises means suitable to be inserted and positioned in holes made in the thickness of spinous processes, said means being shaped to allow the passage of attachment elements working together with fittings on the free ends of said ligaments.

To solve this problem of attaching the ligaments to the spinous processes, the means are made up of two complementary parts that can fit together.

Each part has a hollow cylindrical body, the bodies of the two parts being able to fit together, one of the ends of the bodies being extended by a facial support flange on a corresponding part of the spinous process.

To solve the problem of attaching the ligaments, the ligament fittings are made up of eyelets set in the end of said ligaments.

The elements of the assembly are made up of a system comprising a bolt, two screws and a pin.

The invention is explained hereinafter in detail with the help of appended drawings in which:

Figure 1 is a perspective view of the elements for attaching ligaments, inserted in the spinous processes.

Figure 2 is a top view of a ligament equipped with attachment fittings.

Figure 3 is a longitudinal section showing the placement of the device according to the invention.

Figure 4 is a top view corresponding to figure 3.

As it is known, the prosthetic element comprises a shock-absorbing element (1), comprising a block suitable to be placed between two spinous processes (E1) and (E2). The block (1) is shaped for the passage of artificial ligaments (2) under specific conditions. More particularly, the block (1) is made of a semi-rigid material, in the

form, for example, of a cylindrical body. The block (1) is pierced through for the passage of ligaments (2).

Preferably, the block is pierced for the criss-cross passage of two ligaments. The block (2) may, as is known, have different heights to space the vertebrae with reduced distraction.

According to the invention, the device, suitable for attaching ligaments (2), has means shaped to be inserted and positioned in holes (T) made in the thickness of the spinous processes. As shown in figure 1, the means are made up of two complementary parts (3) and (4). Each part has a hollow cylindrical body (3a) (4a), and the bodies can fit together.

In addition, one of the ends of each body (3a) and (4a) is extended by a facial support flange (3b) and (4b), so as to ensure that the two parts (3) and (4) are centered, after fitting into the corresponding hole in the spinous process. After they are fitted together, the two parts (3) and (4) comprise an element substantially having the form of a roller.

These arrangements thus permit the section of the processes to be tightly held.

According to another characteristic, after the ligaments (2) are inserted in the block (1), the ends (2a) and (2b) of each of the ligaments are equipped with eyelets (5), which preferably are mounted at the tip of said ends.

The ligaments are attached to the processes using the assembly elements, working together with the eyelets (5) and inserted in the hollow bodies (3a) and (4a) of parts (3) and (4). The

assembly elements are made up of a system comprising a bolt (6), two screws (7) (8) and a pin (9).

Now we shall analyze the operating technique for implementation of the device according to the invention.

First the operator pierces the processes very deeply in their mid-line part. Then parts (3) and (4) can be inserted in the holes (T) made. Parts (3) and (4) are fitted in at their hollow bodies (3a) and (4a). The flanges (3b) and 4(b) mate on the corresponding surfaces of the processes (E1) and (E2).

The operator next puts the shock-absorbing block (1) in place between the spinous processes in question (E1) and (E2) and inserts the test ligaments into the block (1) to measure their length.

After taking those steps, the permanent ligaments (2) are inserted into the block (1) and equipped at the tip with eyelets (5). Then the bolt is inserted through the eyelets and the fitted parts (3) and (4), and the assembly is fastened using a screw and lock nut (7) and (8). In case of accidental blockage, the pin (9) ensures that the screw-lock nut system is blocked when shifting.

Clearly, the attachment device as described may be repeated in several places, for example, for three spinous processes. In that case, the same bolt system is used for two successive mountings. The bolt in superposition receives the ends of consecutive ligaments.

The form given the shock-absorbing block and ligaments is not described in detail since it is well known by a person

skilled in the art and furthermore, is suitable for being performed in different variations, depending upon the pathology of the case being treated.

The advantages are clear from the description, in particular the better control of axial rotation is pointed out again and emphasized.

CLAIMS

- 1- Device for attaching a ligament prosthesis comprising a shock-absorbing element (1) placed between two spinous processes (E1) (E2), said element (1) being shaped to allow the passage of artificial ligaments (2), wherein it comprises means (3) and (4) suitable to be inserted and positioned in holes made in the thickness of spinous processes (E1) (E2), said means (3) and (4) being shaped to allow the passage of attachment elements (6) working together with fittings (5) on the free ends of said ligaments (2).
- 2- Device according to claim 1, wherein the means are made up of two complementary parts (3) and (4) that can fit together.
- 3- Device according to claim 2, wherein each part (3) and (4) has a hollow cylindrical body (3a) and (4a), the bodies of the two parts being able to fit together, one of the ends of the bodies (3a) and (4a) being extended by a facial support flange (3b) (4b) on a corresponding part of the spinous process.
- 4- Device according to claim 1, wherein the ligament fittings (2) are made up of eyelets (5) set in the tips of said ligaments.
- 5- Device according to claim 1, wherein the assembly elements are made up of a system comprising a bolt (6), two screws (7) and (8) and a pin (9).
- 6- Device according to claim 1, wherein the shock-absorbing element (1) is a cylinder made of a semi-rigid material.



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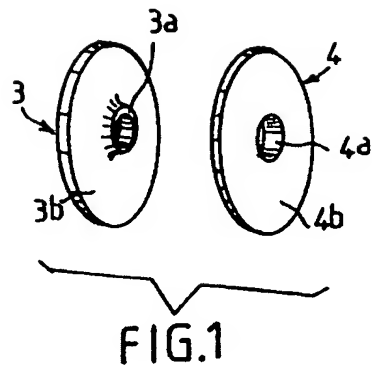


FIG. 2

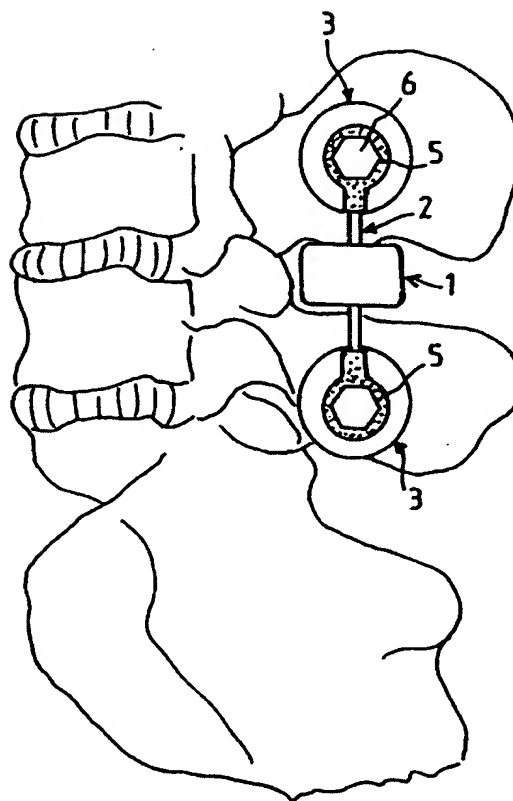
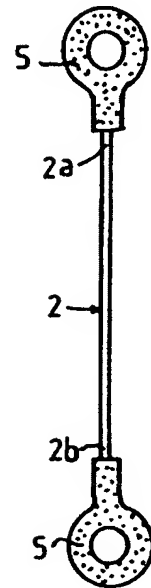
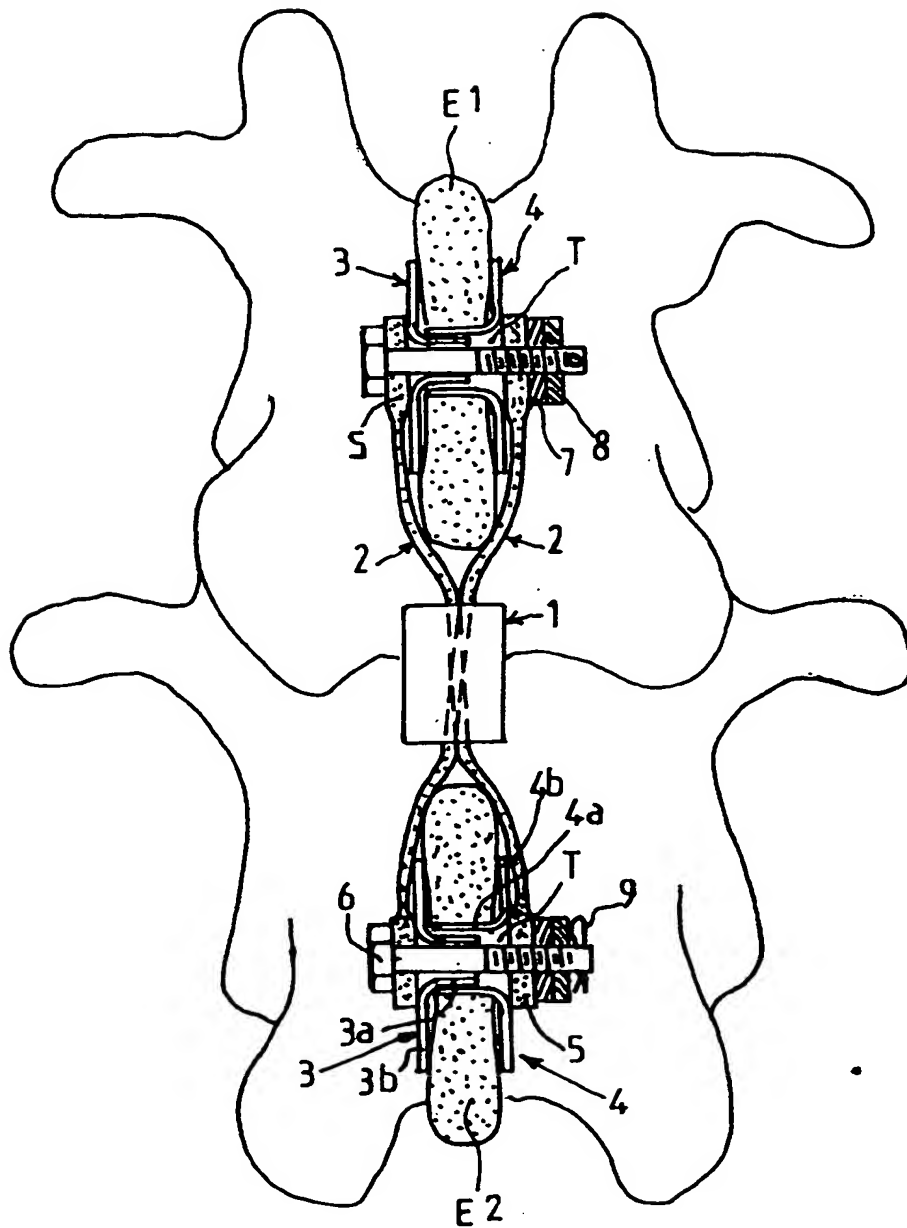


FIG. 4

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FIG. 3



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PRELIMINARY SEARCH REPORT
based on the latest claims filed
before the beginning of the search

FA 506132
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DOCUMENTS CONSIDERED RELEVANT		Relevant claims in the application examined	
Category	Citation of document with indication, if necessary, of the relevant parts		
A	FR-A-2 693 364 (VOYDEVILLE) * Entire document *	1,6	
A	EP-A-O 322 334 (COTE S.A.R.L.) * abridged; claims; drawings *	1,6	
A	EP-A-O 381 588 (BREARD ET AL.) * abridged; drawings 2,2A,2B * * column 6, lines 3-36 *	1	
A	EP-A-O 106 501 (W.L. GORE & ASSOCIATES, INC) * drawings	4	
A	EP-A-O 260 970 (IMPERIAL COLLEGE OF SCIENCE & TECHNOLOGY) * abridged; figure 1 *	4	
			TECHNICAL AREAS SEARCHED (INT. CL. 6)
			A61B A61F
Date search completed 1 Jun 1995		Examiner Giménez Burgos, R	
CATEGORY OF DOCUMENTS CITED			
X: especially pertinent in itself Y: especially pertinent in combination with another document in the same category A: pertinent with regard to at least one claim or general technical background O: unwritten disclosure P: inset document T: theory or principle the invention is based on E: patent dated prior to date of application and not published until this application date or later D: cited in the application L: cited for other reasons &: member of the same family, corresponding document			